

Notice of Allowability

Application No.

09/998,768

Examiner

Abolfazl Tabatabai

Applicant(s)

BANSAL ET AL.

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to application filed on November 29, 2001.
2. ☒ The allowed claim(s) is/are 1-18.
3. ☒ The drawings filed on 29 November 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

Reasons for Allowance

1. The following is an Examiner's statement of reasons for allowance.

The prior art of record fails to teach or suggest, automated lung nodule segmentation using dynamic programming and EM based classification comprising (a) constructing a model of the nodule from the user-selected point, the model being a deformable circle having a set of parameters β that represent a shape of the nodule; estimating continuous parts of the boundary and discontinuities of the boundary until the set of parameters β converges, using dynamic programming and Expectation Maximization (EM) in combination into other features and elements of claims 1 and 12; (b) representing the boundary as a sum B , where $B = (U_i \ B_{ci}) \cup (U_i \ B_{dj})$, B_{ci} represents continuous parts of the boundary and B_{dj} represents discontinuities of the boundary; estimating the continuous parts B_{ci} of the boundary based on a Maximum A-posteriori (MAP) estimate according to an equation $B_{ci} = \arg \max_{B_{ci}} p(B_{ci} | I, \beta)$, I being a slice from the 3D CT volume dataset; estimating a MAP density as $p(B_{ci} | I, \beta) = 1/z \exp(E_{\beta}(B_{ci}))$, $E_{\beta}(B_{ci})$ being a sum of internal shape and external image energies in combination into other features and elements of claim 8.

2. **Claims 1-18 are allowed.**

3. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Citation of Relevant Prior Art

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Zeng et al (U S 6,766,043 disclose pleural nodule detection from CT thoracic images

Clarke et al (U S 5,987,094) disclose computer-assisted method and apparatus for detecting of lung nodules

Yet et al (U S 6,760,468 B1) disclose method and system for the detecting of lung nodule in radiological images using digital image processing and artificial neural network.

Xu et al (U S 6,141,437) disclose CAD method, computer and storage medium for automated detection of lung nodules in digital chest images.

Yoshida et al (U S 6,078,680) disclose method, apparatus, and storage medium for detecting of nodules in biological tissue using wavelet snakes to characterize features in radiographic images.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to ABOLFAZL TABATABAI whose telephone number is (703) 306-5917.

The Examiner can normally be reached on Monday through Friday from 9:30 a.m. to 7:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mehta Bhavesh M, can be reached at

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(703) 308-5246. The fax phone number for organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Abolfazl Tabatabai

Patent Examiner

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November 11, 2004

A handwritten signature in black ink, appearing to read 'Bhavesh M. Mehta', is positioned to the right of the text 'Patent Examiner'.

**BHAVESH M. MEHTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600**